

# CONSOLIDATED INFORMATION TECHNOLOGY SERVICES TASK ASSIGNMENT (TA)

1. **TITLE:** (D318) NGATS ATM-Airspace Project Concept and Software Development

**TA No:** 108-Rev4

**Task Area Monitor:** **Alternate Task Area Monitor:**

**NASA POC:** **Software Control Class:** Low Control

**Type of Task:** Recurring Task

## 2. BACKGROUND

The future National Airspace System (NAS) will be required to handle 2-3 times more traffic than today's system. To accommodate this kind of increase the new, transformed NAS, or Next Generation Air Traffic System (NGATS), will require the implementation of new surveillance architectures, reallocation of control functions, and new methods of separating aircraft.

NASA researchers, working closely with the FAA, will develop and provide design information through analyses, prototyping, and the conduct of laboratory-based simulations to reduce the technical risk of a highly automated NGATS. This research will concentrate predominantly on supporting the Research Focus Areas (RFAs) of: Trajectory Projection, Synthesis and Uncertainty (TPSU), Airspace Super Density Operations (ASDO), Performance Based Services (PBS), and Separation Assurance (SA).

## 3. OBJECTIVE

The Contractor shall provide the services necessary for the development of requirements and software supporting NASA NGATS Airspace Project research in the following RFAs and any others as assigned:

- Trajectory Projection, Synthesis, and Uncertainty (TPSU)
- Airspace Super Density Operations (ASDO)
- Performance Based Services (PBS)
- Separation Assurance (SA)

The LaRC manager responsible for a particular project and the Contractor personnel assigned to that project shall work cooperatively and iteratively, as required, using such

techniques as rapid prototyping, to ensure fulfillment of the mission/task objectives from detailed software task requirements (including software quality and schedule) as specified in the appropriate Software Requirements Document (SRD) for that particular project.

The Contractor shall provide the following (as required) :

- a) Design and development of new software packages to meet specified requirements.
- b) Design and development of new systems integrated from hardware, commercial software, and newly developed applications.
- c) Development of software applications within existing system environments.
- d) Modifications to existing software to change or add to its functionality.
- e) Software support to research including the continuing evolution of algorithms and techniques.

The following activities shall be undertaken by the Contractor in the planning and execution of the work:

- a) Requirements Analysis and Planning
- b) System Integration
- c) Software Design and Development
- d) Software Modification
- e) Quality Assurance and Software Testing
- f) Planning for Installation, Operations, or Maintenance Services
- g) Documentation
- h) Problem Analysis
- i) Process Improvement

These activities shall be incrementally executed as funding and schedule permits.

#### 4. GENERAL IT SUPPORT SERVICES

##### **General IT Support Services Performance Metrics**

Performance Standard: Product quality meets customer expectations.

Performance Metrics:

- Exceeds: Product performance exceeds customer's documented requirements and expectations. Product provides service to the customer beyond anticipated use requirements. Customer provides written or verbal communication indicating the same.
- Meets: The product performs as documented in the requirements and meets customer needs. Customer is satisfied with product and uses in the manner intended.
- Fails: Product does not perform as documented in the requirements and customer expectations are not met. Customer is not satisfied with product and cannot use in the manner intended.

Performance Standard: The contractor delivers products (applications, data, etc.) within costs and schedule.

Performance Metrics:

- Exceeds: The contractor delivers products to the customer prior to scheduled delivery date and under cost.
- Meets: The contractor delivers products to the customer on scheduled delivery date and within cost.
- Fails: The contractor delivers products to the customer after scheduled delivery date and/or exceeds stated cost by more than ten percent.

#### 5. SYSTEM AND APPLICATION DEVELOPMENT SERVICES

Project Title: Research Tool Design, Development, and Implementation (RTDDI)

LaRC Software Manager:

Software Software Control Class: Low

Responsibilities of Contractor and LaRC personnel: The Government will provide the Contractor with access to the Air Traffic Operations Lab (ATOL) and all necessary computer software and computer equipment located at Langley Research Center for development, integration, and test of all software developed in support of this TA. The availability of any Government-provided software and documentation will depend on release dates, rights in data, and may require non-disclosure agreements to be executed. Other information may also be provided as necessary.

**Requirements:**

- a. In collaboration with NASA researchers, the contractor shall develop software tools,

procedures, and materials to facilitate and improve the conduct of current and future experiments. Examples are: simulation management checklists and protocol, subject pilot training curricula and materials, electronic and/or paper questionnaires, test-matrix counterbalancing tools, and data analysis templates and procedures for quick-look and detailed analysis.

b. As appropriate, the contractor shall assist the NASA research personnel in preparation of NASA research activities. To be performed on a case-by-case experiment basis, such contributions may include: reviewing and/or providing input to the experiment design; defining appropriate metrics for the experiment that will support relevant data analysis; defining appropriate methods or parameters for data acquisition; reviewing and/or providing input to human-subject briefing materials, training and testing processes, and questionnaires; and reviewing and/or providing input to the experiment plan and related documentation.

c. As appropriate, the Contractor shall assist the NASA research personnel on a case-by-case experiment basis in the conduct of the test during dry runs, execution, data analysis, and reporting. This may involve controlling the performance of software pseudo-pilots and pseudo-controllers for experiment dry runs and execution. This may also involve management of the processing, archival, and retrieval of experimental data files. This may also involve assistance in the data analysis and reporting functions, including numerical-data analyses, assessing concept and human performance, documenting lessons learned for future experiments, and assisting in the preparation of documentation material for research reporting purposes.

Project Title: Autonomous Operations Planner (AOP) Design and Development

LaRC Software Manager:

Software Software Control Class: Low

Responsibilities of Contractor and LaRC personnel: The Government will provide the Contractor with access to the Air Traffic Operations Lab and all necessary computer software and computer equipment located at Langley Research Center for development, integration and test of all software developed in support of this TA. The availability of any Government-provided software and documentation will depend on release dates, rights in data, and may require non-disclosure agreements to be executed. Other information may also be provided as necessary.

**Requirements:**

The contractor shall perform duties as a technical expert in AOP conflict resolution and trajectory generation requirements. As such:

a. The contractor shall assist the AOP and RPFMS teams in implementing the functionality developed under previous projects and assist in debugging and refining conflict resolution functionality on an as-needed basis.

b. The contractor shall ensure consistency in AOP functionality and assure that it meets the research objectives.

c. The contractor shall act proactively to identify design changes that will mitigate potential

new requirements that have not yet been identified, i.e. such as the strategic resolution algorithm redesign.

d. The contractor shall act as the liaison between the research group and the development group.

e. The contractor shall act as NASA's main source for current AOP capabilities and potential extensions to these capabilities. The contractor shall work with the NASA researchers to identify "what is possible" and to work out compromises in capabilities, as necessary, to meet their objectives. The contractor shall represent the "bottoms up" perspective for the NASA researchers, who are working things from the "top down".

f. The contractor shall perform some of the more challenging design aspects of AOP, i.e. the original design for the genetic algorithm.

Project Title: Requirements Analysis - Benefits

LaRC Software Manager:

Software Software Control Class: Low

Responsibilities of Contractor and LaRC personnel: The Government will provide the Contractor with access to the Air Traffic Operations Lab and all necessary computer software and computer equipment located at Langley Research Center for development, integration and test of all software developed in support of this TA. The availability of any Government-provided software and documentation will depend on release dates, rights in data, and may require non-disclosure agreements to be executed. Other information may also be provided as necessary.

**Requirements:**

The Contractor shall provide subject matter expertise to support Benefits Analyses as part of the Requirements Analysis Phase. This activity will contribute to the definition of initial concepts, top-level mission/task objectives, schedule, and preliminary software requirements.

The Contractor shall assist NASA researchers in performing requirements analyses of existing Airborne Separation software tools, independent analysis of mathematical, logical, system approaches and/or comparison studies of competing techniques to solve potential NAS problems in the desired research focus areas. These analyses shall support the development of requirements for the desired software, target computer system, computer programs, results, documentation or other deliverables required to support future research. This may include meetings with other government, industrial, and aviation organization subject matter experts.

The Contractor shall also assist NASA researchers in performing a benefits analysis on the potential research areas. The analysis results will be used in the determination of mission/software requirements by assessing the validity of proposed research objectives.

Project Title: Requirements Analysis - Concepts

LaRC Software Manager:

Software Software Control Class: Low

Responsibilities of Contractor and LaRC personnel: The Government will provide the Contractor with access to the Air Traffic Operations Lab and all necessary computer software and computer equipment located at Langley Research Center for development, integration and test of all software developed in support of this TA. The availability of any Government-provided software and documentation will depend on release dates, rights in data, and may require non-disclosure agreements to be executed. Other information may also be provided as necessary.

**Requirements:**

The Contractor shall provide subject matter expertise to support Concept Development as part of the Requirements Analysis Phase. This activity will contribute to the definition of initial concepts, top-level mission/task objectives, schedule, and preliminary software requirements.

The Contractor shall assist NASA researchers in the development of preliminary candidate operational concepts employing the use of Airborne Traffic Management software in the specified areas of research. These candidate operational concepts shall include operational procedures, non-system specific crew procedures and applicable system requirements. This may include meetings with other government, industrial, and aviation organization subject matter experts.

The Contractor shall assist NASA researchers in the development of the requirements of airborne-based, cockpit software tool(s) to support the defined operational concepts.

The Contractor shall assist NASA researchers in the investigation of alternative algorithms, display approaches, procedures, and phraseology, and help down-select, implement, and evaluate the most promising alternatives and refine them to establish baselines for the concept and the enabling technologies.

Project Title: Requirements Analysis - Feasibility

LaRC Software Manager:

Software Software Control Class: Low

Responsibilities of Contractor and LaRC personnel: The Government will provide the Contractor with access to the Air Traffic Operations Lab and all necessary computer software and computer equipment located at Langley Research Center for development, integration and test of all software developed in support of this TA. The availability of any Government-provided software and documentation will depend on release dates, rights in data, and may require non-disclosure agreements to be executed. Other information may also be provided as necessary.

**Requirements:**

The Contractor shall provide subject matter expertise to support Feasibility Studies as part of the Requirements Analysis Phase. This activity will contribute to the definition of initial concepts, top-level mission/task objectives, schedule, and preliminary software requirements.

The Contractor shall assist NASA personnel in performing feasibility analyses as required in the areas of research. This activity shall encompass assistance in sub-project and research objective definitions; scope decisions based on analyses of potential benefits in various flight domains, estimates of current and future aircraft equipage; assessments of potential barriers; to include certification issues and experience with previous similar work. This may include meetings with other government, industrial, and aviation organization subject matter experts.

Project Title: 3D Animation Sequence Depicting ATOL Operations

LaRC Software Manager:

Software Software Control Class: Low

Responsibilities of Contractor and LaRC personnel: The Government will provide the Contractor with access to the Air Traffic Operations Lab and all necessary computer software and computer equipment located at Langley Research Center for development, integration and test of all software developed in support of this TA. The availability of any Government-provided software and documentation will depend on release dates, rights in data, and may require non-disclosure agreements to be executed. Other information may also be provided as necessary.

**Requirements:**

The Contractor shall design, develop, and render three dimensional animations (and graphics, if required) that represent the research concepts being developed in the NASA Langley Air Traffic Operations Laboratory. The development of the script and animation content shall be an iterative, joint NASA/Contractor effort.

**6. WORK-AREA SPECIFIC SERVICES**

None required.

**7. Exhibit A**

None required.

**8. SPECIAL SECURITY REQUIREMENTS**

The Contractor shall comply with NASA security requirements applicable to employment of foreign nationals.

**9. SOFTWARE ENGINEERING PROCESS REQUIREMENTS**

The Contractor shall follow the ConITS SA/SPMP as tailored for this application.

**10. JOINT REVIEW SCHEDULE**

Reviews to be held as required.

## 11. PERIOD OF PERFORMANCE

This TA is effective from 02/01/05 to 04/27/09

## 12. TECHNICAL PERFORMANCE RATING

In evaluating Technical Performance, quality and timeliness shall be rated as follows:

Quality: 50%      Timeliness: 50%

## 13. RESPONSE REQUIREMENTS

This Task Plan shall address the contractor's specific work plans, associated estimated labor hours, cost and schedule.

## 14. FUNDING INFORMATION

Funding has not been entered for this TA.

## 15. MILESTONES

None required.

## 16. DELIVERABLES

Number	Deliverable Item	Deliverable Schedule
1	Research Tools Documentation and Software	As required through 4/27/09
2	AOP Documentation and Prototype Software	As required through 4/27/09
3	Benefits Analyses-Requirements Documentation in support of analyses related to future economic benefits to be realized by candidate research objectives.	As required through 4/27/09
4	Concept Development- Requirements Documentation in support of concept definition, airborne cockpit tools, alternative algorithms, display approaches, procedures, and phraseology.	As required through 4/27/09
5	Feasibility Analyses- Requirements Documentation in support of feasibility analyses related to potential benefits in various flight domains, estimates of current and future aircraft equipage, and assessments of potential barriers.	As required through 4/27/09
6	3D ATOL animation media	As required through 4/27/09

## 17. FILE ATTACHMENTS



None.